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Mathematical Models of Biofilm for Antimicrobial Persistence

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Biofilms are known to be persistent to antimicrobial agents. Understanding the mechanism of antimicrobial persistence in biofilm is the essential for developing therapeutic strategies for biofilm-related chronic disease.

In this talk, a simple reactive biofilm model has been developed. Though simple, this model agrees quantitatively well with the experiment results of biofilm treatment at different stages of development, as well as biofilm recovery after treatment. By phase-field approach, this reactive model has been expended into a 3D hydrodynamic model. Numerical simulations of multiple dosing positions and strategies will be shown. Our models appear to be effective tools for analyzing the biofilm treatment with antimicrobial agents.